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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/670,231	09/28/2000	John S. Sadowsky	INTL-0328-US (P8031)	7225

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EXAMINER	
CHAUDRY, MUJTABA M	
ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 09/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/670,231	SADOWSKY, JOHN S.	
	Examiner	Art Unit	
	Mujtaba K Chaudry	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Amendment

Claim Rejections - 35 USC § 112

The Examiner withdraws the rejection of claim 10 under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention because the Applicant's amendments places claim 10 in condition to examine for prior art.

Response to Arguments

Applicant's arguments filed 6-9-03 have been fully considered but they are not persuasive.

The Examiner has reconsidered the claims and concluded that the prior art of record teaches the claimed inventions as earlier presented in the first office action (See paper 3).

Regarding claims 1 and 21, the Applicants contend that Amon et al. does not teach the amended limitations: "a digital signal processor coupled to a butterfly coprocessor" of claims 1 and 21 found in Applicant's argument page 5, paragraph 1.

The Examiner disagrees and asserts that the prior art of record (Amon et al.) does teach the amended limitations: "a digital signal processor coupled to a butterfly coprocessor" of claims 1 and 21. Amon et al. refers to the data processing system as a digital signal processor in column 2, lines 60-62. Amon et al. teaches a butterfly coprocessor (Program Control Unit, 46,Figure 10) in column 6, lines 11-16: " Control circuit performs the control functions for data ALU.. control-circuits determines the shifting operations required for the ACS butterfly operation." Amon teaches a digital signal processor (20) coupled to a butterfly coprocessor (46) in Figure 1.

Moreover, even if Amon et al. did not teach the digital signal processor coupled to a butterfly coprocessor configuration, it would not matter with respect to patentability. Under MPEP 2144.04 V (Design Choice), configuration of parts is not consideration in determining if a claimed device is patentably distinct over the prior art. However, this is not the case because Amon et al. teaches the amended limitations: "a digital signal processor coupled to a butterfly coprocessor" of claims 1 and 21.Because claims 1 and 21 are rejected, claims 2-9,11,12 and 23-26 remain rejected under the same grounds as before (See paper 3).

Regarding claim 10, Amon et al. teaches a data ALU (54) that can perform logarithmic sum exponential operations in Figure 1.

Regarding claims 13,17 and 19, the Applicants further contend that Amon et al. does not teach simultaneously computing two or more new path metrics for the stage based upon the branch metrics found in Applicant's argument page 5, paragraph 2.

The Examiner disagrees and asserts the prior art of record (Amon et al.) does teach all the limitations of the instant application. Amon et al. teaches simultaneously computing two or more path metrics (PM1 and PM2) based upon the branch metrics (blocks 101-103) in Figure 3 found in columns 7 and 8. Furthermore, Amon et al. refers in greater detail simultaneous or parallel calculations of new path metrics based on branch metrics in column 8, lines 39-54. Thus, it evident that Amon et al. teaches simultaneously computing two or more path metrics (PM1 and PM2) based upon the branch metrics. Claims 14-16 and 20-22 remain rejected under the same grounds as before because the rejection of claims 13 and 19 is still maintained (See paper 3).

The previous rejection is maintained. The following is the previous rejection:

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims1-9, 11-14,17-21,23,25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Amon et al. (U.S. 5,742,621).

As per claims 1 and 21, Amon et al. teaches a system comprising all the elements of the instant application. Amon et al. teaches a digital signal processor (data processing system, 20) comprising a bus connectable to a memory (X-memory, 32) in Figure 1. Amon et al. refers to the data processing system as a digital signal processor in column 2, lines 60-62. Amon et al. teaches a butterfly coprocessor (Program Control Unit, 46,Figure 10) in column 6, lines 11-16: " Control circuit performs the control functions for data ALU...control circuits determines the shifting operations required for the ACS butterfly operation." Amon et al. also teaches an arithmetic unit (Data ALU, 54) and a data address generator (address generation unit/DMA controller, 36) coupled to the bus in Figure 1.

As per claims 2 and 3, Amon et al. teaches a data address generator (address generation unit/DMA controller, 36) coupled to the bus in Figure 1. Amon et al. also teaches an arithmetic unit (Data ALU, 54) for performing arithmetic operations in the digital signal processor in Figure 1.

As per claim 4, Amon et al. teaches an arithmetic unit (Data ALU, 54) that comprises a branch metric unit for performing branch metric calculations in column 7, lines 4-5: "To perform the ACS butterfly operation, branch metrics are first calculated and stored in a table Y memory (branch metric unit)".

As per claim 5, Amon et al. teaches an arithmetic unit that comprises one or more registers (accumulator registers) to store results from the branch metric unit in Figure 2.

As per claim 6, Amon et al. teaches a data address register (address generation unit/DMA controller, 36) that may address one or more registers in the arithmetic unit in Figure 1.

As per claims 7 and 9, Amon et al. teaches a butterfly coprocessor (Program Control Unit, 46,Figure 10) that includes a plurality of butterfly units for performing butterfly operations and add-compare-select operations in column 6, lines 55-58: "The ACS (add-compare-select operations) butterfly performs the calculations.... A plurality of the ACS butterfly operations are repeatedly executed".

As per claim 8, Amon et al. teaches butterfly operations are parallel operations in column 6, lines 6-7: "Accumulator shifter is an asynchronous parallel shifter (parallel operation) for shifting the information of accumulator registers".

As per claim 11, Amon et al. teaches a path metric retrieved from a path metric memory is accessed by the data address generator in column 8, lines 29-38: "The contents...are stored at a predetermined location of Y memory (metric memory)...The predetermined location of ...Y memory is determined by...address generation unit (accessing data by the data address generator)...to point to a.... path metric (receiving the path metric)".

As per claim 12, Amon et al. teaches a data address generator of the digital signal that retrieves a branch metric from the branch metric unit in column 7, lines 4-7: "To perform the ACS butterfly operation, branch metrics are first calculated and stored in a table Y memory (branch metric unit)...pointed to by an effective address...located in address generation unit/DMA controller (data address generator)".

As per claim 13, Amon et al. teaches a method comprising all the elements of the instant application. Amon et al. teaches identifying a stage of a trellis diagram(For State[i]) in Figure 3. Amon et al. teaches calculating branch metrics for each node of the stage in column 7, lines 4-7: "To perform the ACS butterfly operation, branch metrics are first calculated." Amon et al. teaches simultaneously computing two or more path metrics (PM1 and PM2) based upon the branch metrics (blocks 101-103) in Figure 3.

As per claims 14 and 20, Amon et al. teaches storing path metrics in a memory in column 8, lines 49-50: "path metric is and result is loaded into accumulator register".

As per 17, Amon et al. teaches a method comprising all the elements of the instant application. Amon et al. teaches a serial communication interface (28) to receive a request to decode a bit stream in Figure 1. Amon et al. teaches identifying a stage of a trellis diagram(For State[i]) in Figure 3. Amon et al. teaches computing branch metrics for each node of the stage in column 7, lines 4-7: "To perform the ACS butterfly operation, branch metrics are first calculated." Amon et al. teaches simultaneously calculating new path metrics (PM1 and PM2) based upon the branch metrics (blocks 101-103) in Figure 3.

As per claim 18, Amon et al. teaches storing new path metrics in a memory in column 8, lines 49-50: "path metric is and result is loaded into accumulator register". Amon et al. teaches identifying a new stage of a trellis diagram (For State[i]) in Figure 3.

As per claim 19, Amon et al. teaches an article comprising a medium storing a software program that comprises all the elements of the instant application. Amon et al. teaches identifying a stage of a trellis diagram(For State[i]) in Figure 3. Amon et al. teaches calculating branch metrics for each node of the stage in column 7, lines 4-7: "To perform the ACS butterfly operation, branch metrics are first calculated." Amon et al. teaches simultaneously computing two or more path metrics (PM1 and PM2) based upon the branch metrics (blocks 101-103) in Figure 3.

As per claim 23, Amon et al. teaches a butterfly coprocessor that comprises a plurality of butterfly units (Barrel Shifter/Bit Field Unit, Accumulator/Rounding Unit, 92 and 80) in Figure 22.

As per claims 25 and 26, Amon et al. teaches computing path metrics for the stage and simultaneously computes a path metric (PM1 and PM2) for each node of the stage (blocks 101-103) in Figure 3.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims15, 16,22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amon et al. (U.S. 5,742,621) in view of Czaja (U.S.5, 796,757).

As per claims 15 and 22, Amon et al. substantially teaches a method comprising all the elements of the instant application. Amon et al. teaches identifying a stage of a trellis diagram (For State[i]) in Figure 3. Amon et al. teaches calculating branch metrics for each node of the stage in column 7, lines 4-7: "To perform the ACS butterfly operation, branch metrics are first calculated." Amon et al. teaches simultaneously computing two or more path metrics (PM1 and PM2) based upon the branch metrics (blocks 101-103) in Figure 3. Amon et al. does not explicitly disclose identifying a number of nodes in a stage and identifying a number of branches extending from each node.

However Czaja, an analogous art, teaches identifying a number of nodes in a stage and identifying a number of branches extending from each node in Figure 10.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Amon et al's system by combining Czaja's node and branch identification analysis with Amon et al.'s system. This modification would have been obvious to a person having ordinary skill in the art because a person having ordinary skill in the

art would have been motivated to use this node and branch identification analysis to determine reliable rate information that also minimizes memory cost, as suggested by Czaja in column 3, lines 34-36.

As per claims 16 and 24, Amon et al. substantially teaches a method comprising all the elements of the instant application. Amon et al. teaches identifying a stage of a trellis diagram (For State[i]) in Figure 3. Amon et al. teaches retrieving a prior path metric from the memory in column 8, lines 29-38: "The contents...are stored at a predetermined location of Y memory (metric memory)...The predetermined location of ...Y memory is determined by...address generation unit (accessing data by the data address generator)...to point to a.... path metric (retrieving the path metric)". Amon et al. teaches calculating branch metrics for each node of the stage in column 7, lines 4-7: "To perform the ACS butterfly operation, branch metrics are first calculated." Amon et al. teaches simultaneously computing two or more path metrics (PM1 and PM2) based upon the branch metrics (blocks 101-103) in Figure 3. Amon et al. teaches allocating a butterfly unit (Barrel Shifter/Bit Field Unit, Accumulator/Rounding Unit, 92 and 80) that is equal the number of nodes in Figure 22. Amon et al. does not explicitly disclose identifying a number of nodes in a stage and identifying a number of branches extending from each node.

However Czaja, an analogous art, teaches identifying a number of nodes in a stage and identifying a number of branches extending from each node in Figure 10.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Amon et al's system by combining Czaja's node and branch identification analysis with Amon et al.'s system. This modification would have been

obvious to a person having ordinary skill in the art because a person having ordinary skill in the art would have been motivated to use this node and branch identification analysis to determine reliable rate information that also minimizes memory cost, as suggested by Czaja in column 3, lines 34-36.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of art with respect to trellis-based channel encoding in general:

U.S. Pat No. 5,784,293 to Lipa

U.S. Pat No. 5,408,502 to How

U.S. Pat No. 5,633,897 to Fettweis et al.

U.S. Pat No. 5,912,908 to Cesari et al.

U.S. Pat No. 6,374,387 to Van den Berghe

U.S. Pat No. 6,257,756 to Zarubinsky et al.

U.S. Pat No. 6,029,267 to Simanapalli et al.

U.S. Pat No. 6,009,128 to Mobin et al.

U.S. Pat No. 5,987,490 to Alidina et al.

U.S. Pat No. 6,115,436 to Ramesh et al.

U.S. Pat No. 6,330,684 to Yamanaka et al.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony T Whittington whose telephone number is 703-306-5617. The examiner can normally be reached on Monday-Friday 7:30a.m.-4:00p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on 703-305-9595. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

A.W.
August 12, 2003

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